Land Condition Trend Analysis (LCTA) is one of the four components of the Integrated Training Area Management (ITAM) program. The ITAM program is a Forces Command (FORSCOM) supported program housed in DPTMS - Range Control. Land Condition Trend Analysis is a repository of scientific data on the natural resources of Fort Lewis. LCTA produces information on the natural resources on Fort Lewis to assist the trainers in fulfilling their mission, while supporting the natural resources division by contributing to sound land management decisions. LCTA collects physical and biological resources data from training lands and ranges in order to relate land conditions to training activities. LCTA incorporates this data into a relational database that can be queried for specific variables that are to be studied. This data is intended to provide information to effectively manage land use and natural resources.

LCTA analyzes the health of vegetation, bird, and small mammal populations and densities. The data is always collected within the Fort Lewis boundaries and can be used to measure the affects of training, nonmilitary use, and land management techniques. The LCTA program is currently shifting from only collecting the natural resources trend data to performing original research to better support and understand the relationship between military training and land condition.

In 1997, the focus was to refine the collection methods that have been utilized in the past and to collect more training specific data. Each field technician was responsible for a priority component of the 1997 LCTA Workplan. These responsibilities included organizing the fieldwork and writing up the final "report of findings". **Enclosed is the collection of the report of findings for the 1997 season.**

The LCTA field technicians have from three to five years of valuable experience on Fort Lewis. As a result they have observed significant year-to-year changes in the ecosystems within the Fort Lewis boundaries, especially on the grasslands. The crew is efficient on identifying Fort Lewis plants, birds, and small mammals. They are experienced with working on a military installation, from the scheduling to the interactions and missions of the Army.

LCTA also provides support and information to the other components of the ITAM program and Range Control. The LCTA research data assists the Land Rehabilitation and Maintenance (LRAM) measure the effects of the management techniques that they implement. The natural resource data provides information to the Environmental Awareness (EA) program to produce Fort Lewis informational tools to prevent unnecessary damage to the training lands. LCTA also provides spot reports of illegal dumping and other unauthorized use of training areas to Range Control.

Under the direction of HQs DA and FORSCOM, an evaluation of the program was performed in January 1996 and August 1996. The result is a complete re-evaluation of the LCTA program nation-wide and the formation of LCTA II. The following LCTA II objectives steer the Fort Lewis LCTA Workplan:

- Provide information that may effect force structuring and stationing at MACOM and DA levels.
- Provide current and predictive resource information that assists in training and testing activities.
- Identify impacts on resources by trainers, testers, and non-military land users.
- Identify and prioritize resource restoration, rehabilitation, and revegetation areas to ensure sustainable training and testing.

The work presented in this document is the result of professional, hard working personnel. If you have any comments or suggestions for improvement please contact Angela Lombardi, LCTA Coordinator at 967-1550.

Acknowledgments

The LCTA program would like to thank the following people for their comments and support of the work completed during the 1997 field season.

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Patrick Dunn	The Nature Conservancy
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Bruce Havery	Pacific Northwest Research Station
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Matt Knox	ENRD – Fish and Wildlife
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Virginia Lanoue	Range Control Systems Administrator
Del Larson	Range Control Scheduling
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Ann Potter	Washington State Fish and Wildlife
Sgt. Richter	Range Control Safety Officer
Brandy Ritchie	ENRD-GIS
Russell Rodgers	The Nature Conservancy
Tracy Rush	Washington Natural Hertiage Program
Inger Schmidt	ITAM Coordinator
John Weller	Range Officer
David Wittacre	Peregrine Fund

The LCTA crew completed an introduction to unexploited ordinance class, map reading class, Global positioning systems training, and utilized the Stone education center's computer facilities.

Land Condition Trend Analysis
1997 Workplan

Prepared by Angela Lombardi, LCTA Coordinator

The overall goal for the 1997 season is to collect scientifically sound data and to use the results for the improvement of training land management.

#1 Core Plots that have had military use

In 1995, 130 Core Plots were completed and the majority of these plots are in mixed forest habitats. Over a two-year period there is a minimal amount of change to the vegetation unless there has been military training in the area. Upon querying the LCTA database I located the core plots that were noted as having military training on them in the 1995 field season. These core plots will definitely be re-monitored in the 1997 field season. A reconnaissance of the core plots that did not have any noted disturbance will be performed and if there is any evidence of military training in the area since 1995, then the plot will be monitored. The core plots that are not monitored in the 1997 field season will be monitored in the 1999 season. Upon completion of the core plots, maps, photos, and data from each plot will be incorporated into the existing LCTA database. All of this data is to assist in making the best management decisions so that training can continue into the future without destroying the integrity of the land.

#2 13th Division Special Use Plots

All 13th Division Prairie special use plots will be monitored in the 1997 field season.

#3 Mortar Point 10

In continuation with the restoration project that was started in 1996, ten special use plots will be monitored. Upon review of the report by Richard Rohbom, LCTA may also continue monitoring Richard's research plots. The details of this project will be included in this workplan when a report is obtained from Richard Rohbom.

#4 Bird Survey

Bird surveys will be conducted this season during the breeding season. The research methods are going to be changed from the previous year's methods but the data will still be able to be incorporated into the existing LCTA database. The reasons for changing methodology are to acquire better bird demographics and to be able to contribute the data to a worldwide project on the decline of songbirds. Upon completion of the monitoring, the data will be inputted into the LCTA database and the study objectives will be clearly stated in the end of season report with the raw data and observations.

#5 Range 79 Special Use Plots

In 1995, one LCTA plot was established on Range 79 because of its high quality prairie habitat. Upon approval from the Range Officer, LCTA will establish two more plots in Range 79. The 1995 plot will be monitored in 1997 as well. The data from these plots will contribute to the knowledge of the effects of tracked vehicles on native prairie flora since Range 79 is used heavily for tracked vehicles.

#6 Range 74 Special Use Plots

As part of an ongoing study on the effects of tracked vehicles on prairie habitat, LCTA will monitor the special use plots in Range 74. The data acquired from Range 74 will provide information on the recovery rate for vegetation and what species occur in disturbed sites. This data will not be able to correlate number of passes to revegetation rates or species composition, per memorandum in 1993.

#7 Water howellia (*Howellia aquatilis*)

In compliance with a subagreement with the Nature Conservancy a study will identify and inventory potential habitat of the Water howellia (*Howellia aquatilis*). All monitoring procedures will be established by TNC and the LCTA crew will conduct the fieldwork. Upon completion of the field season the LCTA crew will produce a report of findings and a GIS map with locations of actual Water howellia and of potential habitat.

#8 Oak Woodland Plots

(Plots that were not done in 1996) In conjunction with LRAM Oak habitat restoration efforts, LCTA will monitor the Oak Woodland special use plots. All of the data will be incorporated into the LCTA database and a progress report will be submitted to the LRAM Coordinator to assist in her planning future habitat enhancement projects.

#9 Threatened, Endangered, or Sensitive Species of Washington State
In compliance with the TES regulations, LCTA will monitor habitats that may have species of concern. An ecological reconnaissance and GPS mapping will conclude the monitoring method unless specific projects have been created for the species of concern. Sequalichew Lake shore will be monitored for the existing population of Bristly Sedge (*Carex comosa*) which is currently on the sensitive list. Small-flowered Trillium (*Trillium parviflorum*), a state sensitive species, will also be monitored at its known locations on the Installation. A reconnaissance will be done in habitat areas that are likely to support sensitive plant species during the expected phenology time period.

#10 Fort Lewis LCTA Methodologies Handbook
The original LCTA methodologies were established by the US Army Core of Engineers in the early '90s and were meant to include a nation wide variety of habitat types. Over the 5 years that LCTA has been on Fort Lewis the methods have been tailored to the Western Washington ecoregion. To properly document the Fort Lewis methodologies a handbook will be initiated in the 1997 season. Included in the handbook will be the specific methods used for the core plots, special use plots, bird surveys, and small mammal surveys. The database will also be detailed in the handbook. The handbook will be an evolving project that will span over two years of work before completion.

#11 Prairie Condition
Update the Prairie Condition map produced by the Washington State Natural Heritage program for Lower Weir prairie. Establish methodologies that are repeatable on the other high use prairies on Fort Lewis. The final product will be a report and a GIS map. The map could be used for planning the training scenarios on Lower Weir while preserving patches of high quality prairie as a seed bank for restoration.

#12 Reconnaissance for the Small vs. Large Prairie Fragments Study
A reconnaissance will be done of the small prairie fragments on the installation. The LCTA crew will give a species list and habitat quality rating to each site. This information will be used to further plan the proposed "Management Practices for Small Prairie Fragments vs. Large Prairies" project.

#13 Seed Collection
In coordination with the LRAM Coordinator, LCTA will assist in collecting seeds for restoration projects. Seed collection will be actual collection and also plant identification. Marking locations of good seed source will also be contributed to this priority.

#14 Butterfly Survey
As a continuation of a TNC project, butterflies will be surveyed every two weeks for a two-hour period. All the information gathered would be incorporated into the existing database at TNC.

#15 Soil compaction Study
The LCTA program will draw up a study on the impacts that tracked vehicles have on soil compaction. Study objectives, research methods, and any necessary field equipment will be written and ready for execution in the 1998 field season. The research will include literature searches at the University of Washington libraries and correspondence with other installations that have an existing soil compaction survey methodologies.

#16 Scotch Broom Monitoring Plots
The LCTA crew will continue the LRAM scotch broom (*Cytisus scoparius*) monitoring project. The project was established in 1995 to monitor the effects of scotch broom removal techniques used by the LRAM crew. The data will be inputted into the existing database by the LCTA crew and then digitized onto a map by the GIS personnel in ENRD.

#17 Spot Reports
All trash or other "dump" items will be reported to the Range Control personnel for proper disposal procedures. The spot reports will include details of the trash and directions to the site accompanied with the UTMs.

#18 Noxious Weed Spot Reports
LCTA will continue to report, map, and mark any sightings of noxious weeds on the Installation. LCTA will also conduct the Nisqually River Float survey for Knapweed along the shoreline.

Assist the Forestry Branch

In exchange for data analysis support, the crew assisted the Forestry Branch with vegetation surveys in the Ponderosa Pine research plots.

Summary Report on LCTA Core and Special Use Vegetation Surveys Conducted on Fort Lewis, 1997

Written by Mari Remsberg

ABSTRACT

During the 1997 field season, one hundred and thirty three vegetation surveys were conducted on Fort Lewis by the LCTA crew (M. Clegg, R. Gilbert, L. Randolph, and M. Remsberg). Twenty plots were core and one hundred and thirteen were special use. Surveys were conducted on 13th Division Prairie, Marion Prairie, Lower and South Lower Prairies, Mortar Point 10, Ranges 74, 79,50, and 51, and Point Salines. All data collection requirements were met as established by the LCTA Coordinator.

The LCTA 1997 Bird Report
Fort Lewis, WA

Written by Michael Clegg

ABSTRACT

The LCTA program began monitoring birds on Fort Lewis in 1992 using the modified point count transect technique. This technique, designed by Pazik for the LCTA program, was used through the 96' field season to compile a species inventory of the birds on Fort Lewis. In 1997, with the inventory complete, the LCTA Bird Monitoring Program decided to establish a series of long-term study plots to address its research objective: To determine the effects, if any, that military training has on passerine birds. In preparation for this project, the current literature was reviewed to find the most appropriate methods for researching the effects of land use impacts on passerine birds in the Pacific Northwest. After having considered various methods for monitoring passerine birds, including the established LCTA method, the Program decided to implement the point count technique.

During the 97' field season, the LCTA Program established and surveyed 59 bird plots according to the point count technique described by Carey (1993) and Ralph (1991).These plots are distributed in Douglas–fir forests and Oak woodlands across Fort Lewis. The program selected oak woodlands and Doug-fir forests as study habitats because of the high diversity of songbirds and military training activities which commonly occur in these two ecosystems. Within each of these two habitats, undisturbed plots were established to gather baseline habitat information and disturbed plots of various land-use types (e.g., Bivouacking, tracked vehicles, artillery fire, etc.) were selected to compare with them.

A Status Report on Endangered, Threatened, and Sensitive Plants Known to Occur on Fort Lewis

Written by Rod Gilbert

Abstract

Military reservations in highly developed urban areas around the United States contain, often by default, the last remaining high quality native habitat in a region. In addition, they often contain rare or vanishing habitats, which in and of themselves harbor rare plants and animals. As a federal agency, the Department of the Army is required under Section 7 of the Endangered Species Act (ESA) to develop management protection plans for plants and animals that occur on military installations that are federally listed, or formally proposed for listing, as endangered or threatened (Rohlf 1997). These are the only taxa afforded some legal protection under the ESA. There are two ranking systems for rare plants in Washington State. One is used by the U.S. Fish and Wildlife Service (USFWS) as the official status for taxa listed under the ESA. The other ranking system, used by the Washington Natural Heritage Program (WNHP), is similar, but status and rank reflect a more extensive and detailed database, and better reflects a taxon's ecological status.

During 1997 the WNHP revised the list of Endangered, Threatened and Sensitive Vascular Plants of Washington (for definitions see Appendix 7). This publication is the working list for rare plants in Washington State. The WNHP, a division within the State Department of Natural Resources (DNR), is responsible for the collection, storage and assimilation of data on rare plants. It also provides technical assistance and data to the USFWS. Plants listed as sensitive in the State of Washington are taxon that are vulnerable or declining and could become state endangered or threatened. State endangered and threatened taxa are then potential candidates for federal listing. Sensitive plants have no legal protection. A reduction in sensitive taxon's population occurring elsewhere in the state can negatively impact the overall status of the same taxon found on Fort Lewis Military Reservation (FLMR). Pro-active management and restoration of sensitive plant habitat on FLMR is multi-beneficial and cost efficient. It can avoid expensive federal listing of both flora and fauna as rare animals share much of the same rare plant habitat. Documenting accurate locations of rare plants, and studying a taxon's biological and geophysical requirements will better equip trainers for planning military land use around rare plant habitat, and aid conservation managers in identifying areas that require restoration.

There are currently five vascular plant species state-listed as endangered, threatened or sensitive (1 threatened, 4 sensitive) that are known to occur on FLMR and historical data for the occurrence of Canadian St. John's wort (*Hypericum majus*), newly listed as sensitive. Currently listed taxa, and revisions affecting FLMR since the 1994 WNHP rare plant list, are:

(1) Water howellia *(Howellia aquatilis*) received federal status in 1994 as threatened under the ESA. This species is found in several wetlands on base. The WNHP is currently developing a management protection and recovery plan for this species;

(2) Green-fruited sedge (*Carex interrupta*) was downgraded from sensitive to 'watch';

(3) Pinefoot (*Pityopus californica*) was recently listed as sensitive. The only known occurrence in the state was discovered in second growth Douglas fir forest in the Rainier Training Area (RTA);

(4) The status of white-top aster (*Aster curtus*), found on native fescue prairies and prairie edge woodlands remained unchanged as sensitive and it is a 'species of concern' with the USFWS.

(5) Bristly sedge (*Carex comosa*), found in marshes, and small flowered trillium (*Trillium parviflorum*) found along riparian edges and in oak woodlands, remained unchanged as sensitive.

During 1997, LCTA staff surveyed for small flowered trillium and bristly sedge, recording locations with a Global Positioning System (GPS), and assisted in surveys for water howellia. WNHP botanists collected survey data for water howellia. Population and occurrence data for *Trillium parviflorum* and *Carex comosa* were collected at each location, and entered into the LCTA ArcView database. Quantitative plot data were not collected. In addition, occurrence data were collected for white-top aster as part of the LCTA prairie-mapping project on Lower Weir prairie.

Land Condition Assessment Mapping
On Fort Lewis' Prairies,
1997

Written by Mari Remsberg

Abstract

As a means to help in the integration of the Army's military training mission, natural resource stewardship, and environmental compliance, The Land Condition Trend Analysis (LCTA) program designed a methodology that can be used to repeatedly assess vegetative quality and track trends of native prairies existing on Fort Lewis, WA. Our goal was to create a map that would clearly delineate areas according to prairie quality. This data could then be used by military trainers to help make decisions regarding suitable places to train. It could also be utilized by land management personnel for mitigation and restoration purposes. We also wanted to get an overall view of where high quality prairie still exists and how much is left.

Methods were tested on Lower Weir Prairie in the Rainier Training Area. Using Global Positioning System, the prairie was divided into twenty-five meter square polygons delineated by UTM coordinates. Data was collected in each polygon on the following attributes: 1) Percentage of native versus introduced grasses, 2*) Cystisus scoparius* (Scot's Broom) percent cover and height, and 3) the presence of *Aster curtus* (White-topped Aster). What resulted was a set of comprehensible maps of each of these four attributes that can help in understanding prairie quality. As was expected, few areas remain on Lower Weir that could be considered as native grassland habitat. This information can aid in decisions regarding ideal locations for high impact military training, or areas where native prairie conditions no longer exist. These methods are both time efficient and easy to use and can be repeated in the field in subsequent years for the purpose of tracking long term effects of military training.

LCTA SEED COLLECTION REPORT
Fort Lewis, WA 1997

Written by Michael Clegg

Abstract

During the 1997 field season the LCTA crew collected seed from several different native prairie plant species across Fort Lewis. The focus of this year's seed collection effort was on prairies. Prairies are the most sensitive and extensively trained habitat on Fort Lewis, and therefor the highest priority for restoration. The LCTA seed collection project was implemented to support future restoration projects conducted by the Fort Lewis Land Rehabilitation and Maintenance Program (LRAM).

The plant species, date and location were recorded for all seeds collected. All plant species were collected as they naturally spread their seed, after fruits had matured. Following collection, seeds were separated from plant litter, placed in a paper envelope and stored in LCTA office (i.e., cool, dry, dark). The table below lists the dates and locations for collected species. The dates and locations listed on this table should be considered when planning future seed collection efforts.

Summary Report of LCTA Butterfly Surveys Conducted on Fort Lewis, WA, May – August, 1997

Written by Lisa Randolph

Abstract

Within the South Puget Sound prairie landscape there are at least seven butterfly species dependent upon intact prairie ecosystems (Pyle, 1989). The majority of remaining prairie ecosystem in this region resides within the boundary of Fort Lewis Military Reservation (Char, 1995). This report outlines the activities of this year's butterfly surveys, preliminary results, suggestions for improvement, and additional butterfly life history information observed at Fort Lewis. Two sites selected for surveying this year were Johnson Prairie in Training Area 22 and South of South Creek in Training Area 15 (TA15). Surveys conducted in previous years by The Nature Conservancy (TNC) and Fort Lewis Land Rehabilitation and Maintenance (LRAM) crew suggest these sites have significant value to some butterfly species.

This year, with the assistance of the Washington Department of Fish and Wildlife, the Natural Heritage Program of the Department of Natural Resources, and the Nature Conservancy of Washington, a standardized butterfly methodology has been developed for Fort Lewis to assess species distribution, abundance, and composition. During the course of the 1997 field season the LCTA survey crew gained intimate familiarity with identifying prairie associated butterfly species. Over time, consistent surveys may reveal trends in butterfly populations and metapopulations.

Report on Noxious Weeds Found on Fort Lewis, WA, 1997

Written by Mari Remsberg

Abstract

During the 1997 field season, the Land Condition Trend Analysis (LCTA) crew searched for and recorded the locations of Class B designate noxious weeds found on Fort Lewis.
This report discusses the six different species that were monitored, these being Diffuse Knapweed, Spotted Knapweed, Meadow Knapweed, Brazilian Elodea, Leafy Spurge, and Purple Loosestrife. These species occupy a variety of different habitat types and threaten the natural integrity of Fort Lewis' natural resources. Global Positioning System (GPS) field computers were used to document most locations. Along the Nisqually River, a Fort Lewis Military Installation Map was used to record infested areas. Attempts were made by the LCTA crew to manually eliminate most populations by pulling the individual weeds from the ground and disposing of them in an appropriate manner. Some of the populations were too large to accomplish this so the exact location of these areas can help to aid weed control managers in their attempts to control more widespread noxious weed infestations.

Monitoring of Small Mammal Populations
on the Fort Lewis Military Installation 1997
Written by John Paul and Barb Wood
Contracted by Colorado State University, Fort Collins, CO

Abstract

The focus of this paper was to investigate various methods currently applied in the field of small mammal population surveys conducted in the Pacific Northwest. Information collected through published literature and actual fieldwork determined the most appropriate survey methods that can be used to gather the small mammal baseline data for Fort Lewis, WA. This data is necessitated by the Land Condition Trend Analysis (LCTA) program within the Integrated Training Area Management program. We explore the problems associated with monitoring their populations and recommend methods for live trapping and monitoring through signs (tracking, nests, and mounds). We introduce the small mammal species known to occur on Fort Lewis to assist future researchers in identification. We propose an "ideal" monitoring methodology for the program and discuss the expected benefits and results. In addition, we present a scaled-down version of the methodologies that can be applied when financial and time constraints are considerations.

Reconnaissance of Small vs. Large Prairie Fragments Study
Summary Report

Written by Lisa Randolph

Abstract

The purpose of this study is to assess the ecological quality of remnant prairie habitat that exists outside of the larger prairie landscape on Fort Lewis. If it is determined that these small prairie remnants hold a significant amount of native flora, then there are many potential ramifications. This field season, the LCTA crew conducted reconnaissance surveys of many small prairie remnants and attempted to design survey methods that would yield statistically valid comparisons. Upon completing some preliminary reconnaissance it soon became apparent that this project was beyond our scope and resource capacity.